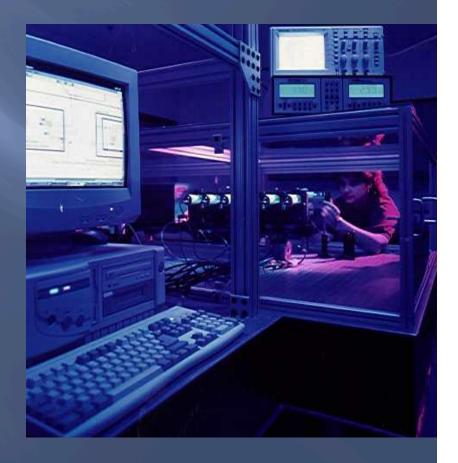
HOW TO SELECT A POWER METER

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How to select a power meter

- The first thing one generally has to do is look in depth at what type of laser has, and its parameters that one needs to measure.
- From that information you can determine what type of sensor (detector) one needs and then look at the instrument one will need to display the results.

Determining Sensor Type

- ➤ Is laser Continuous Wave (CW)?
- Is laser Pulsed?
- Wavelength?
- Min and Max Energy or Power?
- Beam size

Determining Sensor Type

- If the laser is continuous you will either need a thermopile or photodiode sensor.
- Knowing the min and max power and wavelength range will determine which of these to choose.

Determining Sensor Type

- > Thermopiles
 - > Spectrally broadband from UV to FAR IR
 - > 50 microW to 10 kiloW

> Photodiodes

- Not spectrally flat, limited spectral range
- > Silicon 190 -1100 nm
- Germanium 700 1800 nm
- ► InGaAs 800 1700
- picoW 1 W

Determining Sensor Type if Thermopile

Two Types of Absorbers

> Surface Absorbers

- ➤ The laser light is absorbed in the front surface of the sensor.
- > Optical black paint: 500 W/cm2, 50 mJ/cm2 @ 10 nsec
- High Temp Ceramic: 26 kW/cm2, 300 mJ/cm2 @ 10 nsec

> Volume Absorbers

- The laser light is absorbed in a bulk material and then conducted to the metal disc.
- Typical lasers include Q-switched relative high energy Nd:YAG, Ruby, Alexandrite, and

If Your Laser is Pulsed

- You may need a pyroelectric sensor if:
 - > Rep rate is single shot to 25 kHz
 - > Spectrally broadband from UV to FAR IR

Watt's a Joule?

- Conversely, if one knows the Average Power and repetition frequency, one can get the Average Energy per pulse.
- Energy = Average
 Power divided by pulse
 repetition frequency,
 i.e. 1 mJ = 1 W/1 kHz.



Watt's a Joule?

Peak Power

- Watts of Peak Power = Energy in Joules divided by pulsewidth (FWHM), For example:
- 1 Joule @ 10 nsec = 100 MegaWatts
- Fluence, or energy density per unit area, is just Energy divided by area being irradiated. If energy is known just divide by area. For example: 1 mJ pulse in a 1 cm2 area = 1 mJ/cm2
- Irradiance, or power density per unit area, is just Power divided by area

Selecting an Instrument Readout

- What features do you need?
 - Statistics on board?
 - Portability?
 - Battery Operation?
 - Computer interface?
 - User interface?
 - Multi-channel?
 - Wireless?

